



NEW THERMAL ESTABLISHMENT OF VICHY

---

METHODICAL  
MOVEMENTS AND MASSAGE

AS

Complement of the Hydro-Mineral treatment

BY

D<sup>r</sup> Ch. VERMEULEN

IN CHARGE OF THE MECANOTHERAPEUTICAL DÉPARTEMENT  
IN THE THERMAL ESTABLISHMENT OF VICHY



PARIS

A. MALOINE, ÉDITEUR

25-27, RUE DE L'ÉCOLE-DE-MÉDECINE, 25-27

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1905

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## INTRODUCTION

The “Compagnie Fermière”, always in search of progress which science has sanctioned, has made the thermal residence of Vichy not only the most attractive and most gay but above all the most efficient; a place of pleasure where the most serious and the most efficacious cures are performed.

In the new Thermal Establishment, a real Bathing Palace, which Professor Landouzy called a thermal Basilica, are combined all the principal forms of physical therapy, which belonging to the external treatment, are the indispensable complements of the drinking cure.

In this large establishment, the most complete which exists in France as well as in foreign countries, all the therapeutical resources, produced by external use of Vichy water, are utilised;

General and local baths, in tubs or swimming;

All kind of douches, such as ascendant douches (intestinal, which one can take sitting or laying down), vaginal, nasal, auricular douches, douches in tubs;

Gargles, pulverisations, washing out of the stomach;

Baths, douches and humectations of carbonic acid, etc.

Air, damp, heat, light and electricity are used in all forms:

Oxygen-inhalations; steam, hot air or thermo-resinal-baths;

Steam-douches, Russian and Turco-Roman baths, humectations of every mineral water;

Light baths, local or general (Dowsing system);

Hydro-electric baths; continued currents; electrolysis; induction currents, faradic-sinusoidal, ondulatory; franklinisation by baths, douches, fluids or electric sparks.

\*  
\* \*

In a large hall, in the centre of the building, the Compagnie Fermière has established the Mecanotherapeutical department, comprising the most complete and perfect collection of the world-reknowned machines invented by Doctor Zander of Stockholm; various dependencies are reserved for private treatment by vibration or manual massage.

Of all physical treatments, the medication by methodical movements and this in scientific form i. e. the mecanotherapy, is the most simple and we may say the most physiological.

It becomes the most appreciated complement of the hydro-mineral cures, such as proved by the complete installations of mecanotherapy existing in the great foreign watering resorts, as Carlsbad, Marienbad, Homburg, Montecatini, Abazzia, etc.





Fig. 1. — View of the Thermal Establishment.



# METHODICAL MOVEMENTS AND MASSAGE

## The Mecanotherapy.

« The richness of a wateringplace  
depends of the variety of its resources ».  
D<sup>r</sup> MAX DURAND-FARDEL.

The mecanotherapy is nothing else than the Swedish medical gymnastics in which the apparatus takes up the role of assistant; its object is the application to hygiene and to therapeutics of methodical exercises and movements by means of an absolute mathematical precision which permit to fraction the exercise, to localise the movement to a portion of the body, to a member or one of its parts, in order to attenuate the effort and to avoid by this way fatigue.

This method is also a functional treatment characterised by mildness and precision and designed to awake the latent forces of the organism and to help nature in her constant tendency to maintain or to re-establish the functional balance.

It is a physiological medication of which the pathogenic indication is the "*meiopragia*", it is the diminution of the functional capacity of a member of an organ or of all the body. By dosing and localisation of the methodical exercise, and by modification of its form, we obtain at one time a moderating and at another a stimulating action on the principal vital functions, such as the

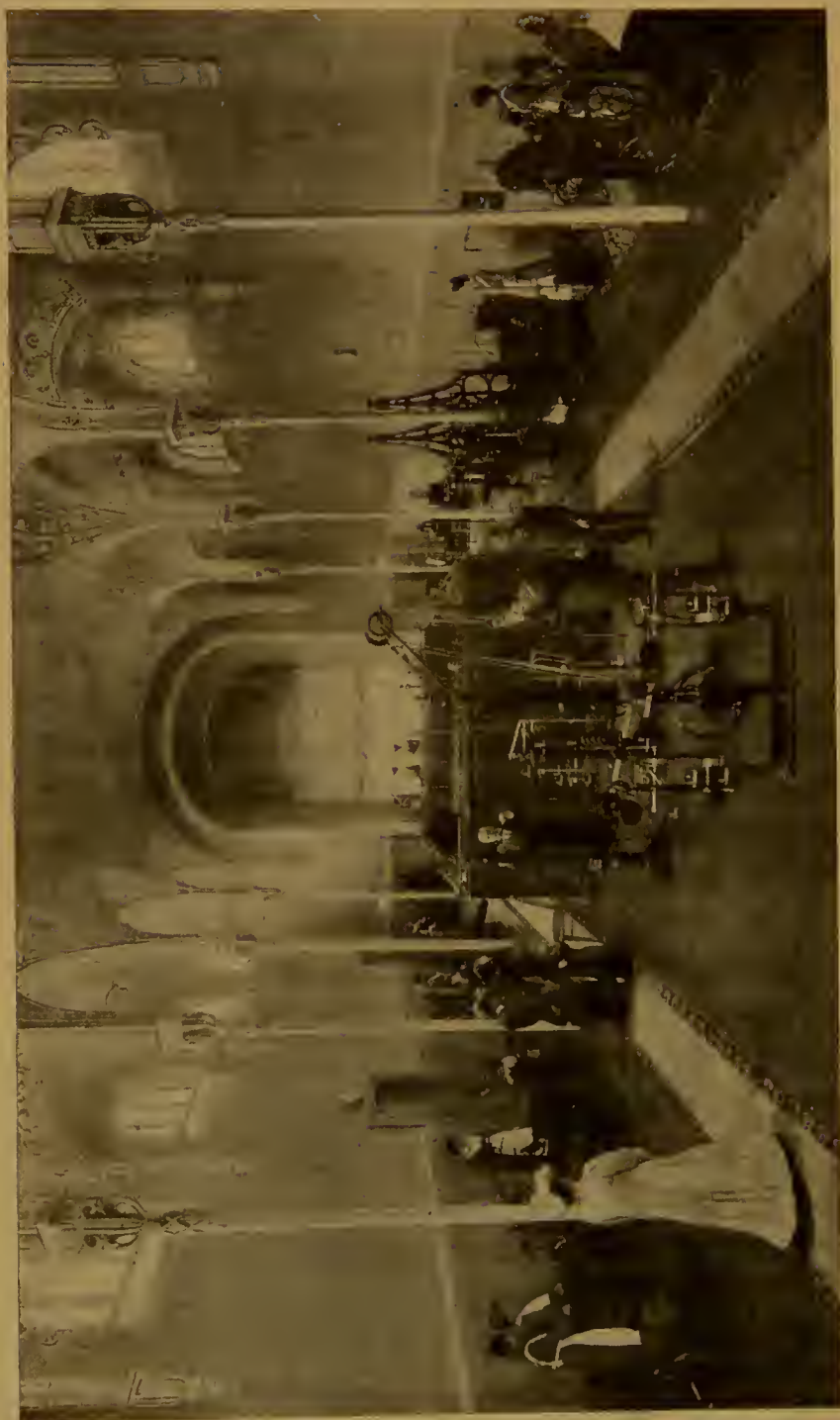


Fig. 2. — Mecanotherapeutical Department.

innervation, respiration, circulation and consequently on the nutrition.

This functional medication is not exclusively reserved to articular and muscular injuries but suits perfectly the alterations of nutrition.

### **The massage.**

The massage, which is only a special modality of passive movement, is the indispensable complement of the mecanotherapy ; it is connected in so natural and so close a manner to methodical movements that it is not possible to separate them either in their study, or application.

The treatment of articular and muscular weakness by passive and active movements must begin by massage of the part submitted to movement.

The superficial massage, produces an anesthesia not only on the surface but in a certain degree on the deeper parts and dispose them to undergo with less pain the movements communicated to them ; the hacking, tapping, pinching and rubbing have on the muscles the same kind of effect ; they produce their relaxation by diminishing their excitability and their soreness, and thereby remove the impediment to the movement which we intend communicating to the member.

The massage produces on the tissues an immediate mechanical effect ; it mobilises, liberates the adhesions and eases the slipping ; everywhere it brings back pliability and restores the normal consistency of the skin, the

cellular tissue, the aponeurosis, the synovial sheaths, the sinews and the muscles.

Even it has an evident vital action, caused either by the stimulation of the vascular system and the better division of the afflux of the blood, or by the modification it gives to the activity of the proper anatomical elements; it favours nutrition and the repair; return to the normal state of the deteriorated muscles following on the influence of massage is the most convincing proof and the best example. (P. Berger (1)).

### The vibrotherapy.

The vibration is a form of massage in which the hand is advantageously replaced by a machine, assuring a fast unlimited number of regular and equal vibrations per minute and at the same time affords the possibility of increasing at will their intensity.

*It is important to distinguish the continual vibration, in which there is a close and uninterrupted contact between vibrator and body and the intermittent vibration, called « trepidation », in which the sore part is subdued to the action of a succession of broken contacts.*

The continual vibration, usually called “vibration” has a sedatif power which can produce a real anæsthesy; it is indicated in neuralgia, contracture and angiospasm.

The trepidation has an exciting influence and is ordered

(1) P. Berger. *Traité de chirurgie orthopédique*. Paris, 1904. Steinhell. Ed.



in case of paralysis, synovial exsudates and circulatory disturbances with passive vasodilatation.

### **The medico-mechanical apparatus.**

As early as the year 1857, Doctor Zander conceived the idea of practising medical gymnastics by means of apparatus which he called “medico-mechanical.”

Feeling justified in his hope of success by numerous experiments, he determined to work-out a complete method of treatment for this new kind of medical gymnastics.

At present, the complete collection contains 74 apparatus, comprising two groups :

1° Apparatus for active movements.

2° Apparatus for passive movements.

All these apparatus are constructed in such a way that when the patient is in a correct position, he can move no other muscle, nor any other part of the body than that to be treated, so that the movement will always be correctly made, concerning its direction, amplitude and strength.

Every apparatus is indicated by a letter and a number; the letter indicates the part of the body for which the apparatus is constructed, the number the special form of the movement.

On the apparatus for active movements, the resistance is indicated on a lever ; on those for passive movements, the amplitude is regulated by an excentric.

By this way it is easy for the doctor to give to his assis-

tant for each patient, on a short note, all the indications about the apparatus to be used, the intensity of the resistance, the speed of the movements, its amplitude and the length of time for the exercise.

### **Apparatus for active movements.**

These are brought into action by the patient himself.

They are divided into three series corresponding :

The first to the movement of the upper member, designated by the letter A; the second to those of the lower member, designated by the letter B; the third to those of the rump, called by the letter C.

In most of these apparatus the resistance, which the muscles have to overcome is indicated by a weight movable along the graduated arm of a lever.

By moving the weight along the lever, it is possible to state with mathematical precision the effort which the muscles produce and to gradually increase it according to the improving strength of the patient.

The arm of the lever is so articulated that the movement is only possible in one direction; the members, the rump and the head being movable in different directions, there is an apparatus for every kind of movement such as : *extension, flexion, abduction, rotation and circumduction.*



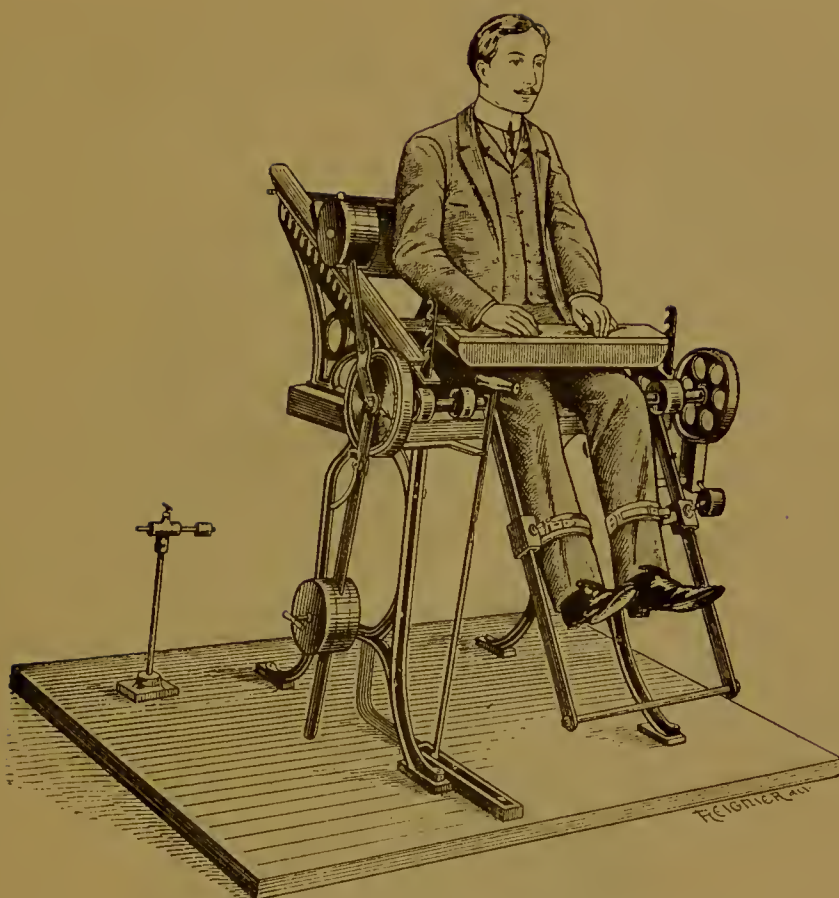


Fig. 3. — Apparatus for active movement. — Active flexion or extension of the leg.

### Apparatus for passive movements.

These are moved by steam, gaz or electricity and are designed to communicate to the member or to the body movements by which the will of the patient has not to intervene.

The movement produced by the machine is both regular and continuous; it is the ideal method for mobilising stiff

articulations without pain; it takes away the swelling of the member, relaxes the adhesions, eases the slipping of the tendons in their sheaths and activates the resorption of intracellular extravasation.



Fig. 4. — Apparatus for passive movement. — Passive dilatation of the chest; respiration gymnastics.

### **The Mechanical Vibration.**

In the mecanotherapy two kinds of apparatus are employed for vibration: Zander's great vibrator and Lied-bech's vibrator, the latter having undergone numerous improvements.

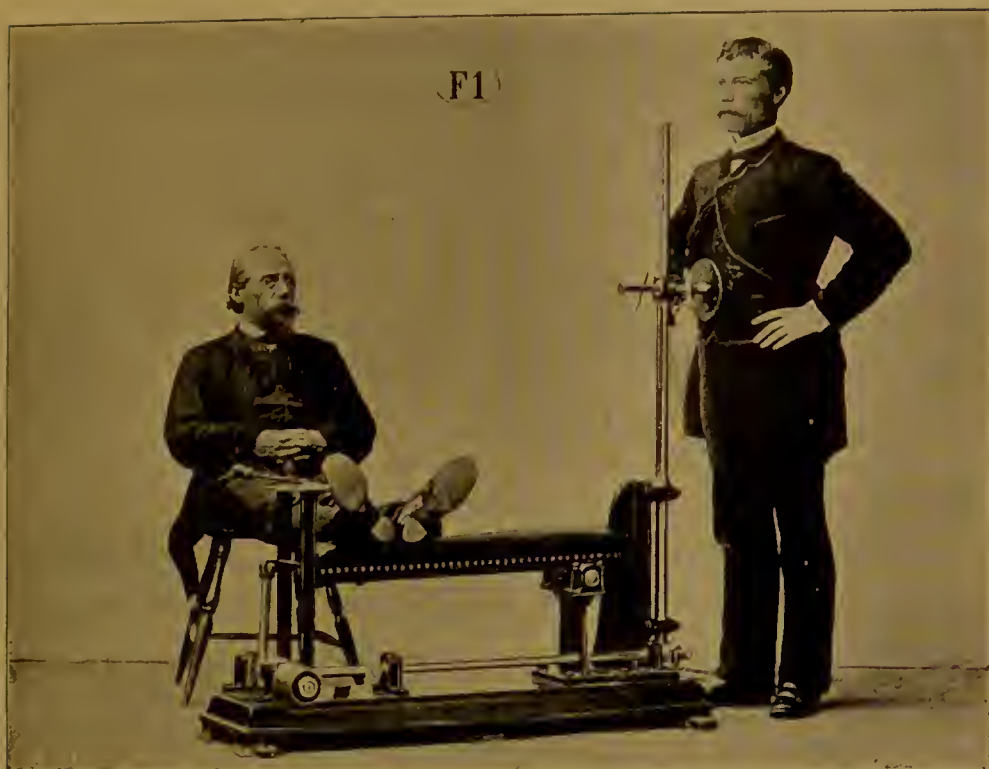


Fig. 5. — Zander's Vibrator.

Zander's vibrator (Fig 5) is composed of a horizontal bench on which the patient can put his legs and of a vertical shaft on which is fixed an horizontal arm, on which can be adopted plugs or cushions of different shape for the vibration of the stomach, bowels, heart and the sinews.

This apparatus produces 300 vibrations per minute.

Liedbech's vibrator is composed of an electric motor which produces the movement to a flexible arm, communicating it to an universal lock, articulated on its free end part and to which one adopts the different instruments applied to the body.

The pace of the motor, which can attain 2500 revolutions, is regulated through a rheostat.

### **The Course of Mecanotherapy.**

When visited in the midst of the thermal season, the Mecanotherapy department is very interesting.

Persons of all ages and of both sexes are to be seen, everyone provided with a note on which are indicated the different exercises and movements he requires.

The mecanotherapeutical treatment takes about three quarters of an hour ; it is divided into three parts each of which comprises three or five different exercises.

The patient has to follow these as ordered on his note and to take the rest as is indicated between the three parts of the treatment.

These exercises do not require special toilet; too tightly laced stays disagree with the methodical breathing and with the abdominal movements.

The treatment has not to be taken immediately after meals but at least two hours after same.

The immediate result of the methodical exercises should always be to produce a resting feeling to the patient.

The special doctor has to find the doses suitable to every special case.

## SECOND PART

Some of the principal ailments treated in Vichy, for which the methodical movements and massage are the most advantageous and almost indispensable complements of the thermal cure.

### 1. — **Disturbances of Circulation.**

The close affinity which exists between chronic diseases of heart and vessels and the manifestations of arthritic diathesis such as: chronic rheumatism, gout, diabetes, obesity and dyspepsia, is the reason why we meet in Vichy such great a number of patients suffering from troubles of circulation.

The cure of the disturbances of circulation by methodical movements and massage is one of the most interesting applications of modern medicine; it is less grounded on the nature and the size of the anatomical lesion than on the spécial form of the functional trouble.

In view of this functional treatment, patients affected

with idiopathic or symptomatic troubles of circulation can be brought in two classes:

1° *Those affected with a too high tension in the arteries, the hypertendous;*

2° *Those affected with a too low tension in the arteries, the hypotendous.*

### **The hypertendous.**

In arterial hypertension, it may be simply mechanic as in the valvular aortic, or of toxic origin such as in the arteriosclerosis, there always exists an erethism cardiovascularis, which fatigues the heart and wears out the elasticity of the arterial coat.

In this, the elements of the mecanotherapeutical treatment are:

1° *Passive movements, which relieve and facilitate the peripheral circulation;*

2° *Automatic exercises and the sedative vibration which by diminishing the excitability of cardio-vascular centre withstand the angiospasm;*

3° *The active exercises which must be given at therapeutic doses, viz absorbing only a small part of the specific energy of the muscles and limited at the great muscular groups.*

In this form, this exercise diminishes the arterial pressure when there exists hypertension.

But it is known that heartdisease of arterial origin is continually exposed to cardiac dilatation; so is the combination and the proportioning of these exercises a question



of clinical feeling and as well as digitalis can be indicated at a certain moment in arterial cardiopathies, so it is the case with certain exercises having for immediate effect the stimulation of the heart.



Fig. 6. — Apparatus for automatic exercise. Circumduction of the arm.

The hypertendous, intoxicated, threatened with arteriosclerosis are often obese, gouty and diabetic persons; those patients are numerous at Vichy and the functional medication is certainly for them the most useful, if not the most indispensable complement, of the thermal cure.

\*  
\* \*

*Through its effect on the heart and the vessels, mechanotherapy is the functional treatment, both prophylactic and curative of arteriosclerosis.*

*As much as the abuse of exercise exhausts the elasticity of the arterial coat, so is it conserved by a moderate exercise.*

In all cases of hypertension, *which is the fore-runner of arteriosclerosis*, we prescribe especially the automatic movements in which the muscular activity is insignificant and that of the nerves reduced to zero.

Physiology teaches that the automatic movements are on the dependance of the sub-cortical centre of the brain and produce a sedative action on the cortical part of it; by numerous clinical observations we have demonstrated the sedative action of the automatic movements on the cardio vascular innervation.

The automatic exercise, whilst presenting all the advantages of the passive movement, is in reality an active movement which we can dose and localise.

For instance, to walk on a flat ground is the type of a natural automatic movement, whilst an ascendary walk is an automatic movement combined with resistance.

Doctor Oertel was the first, who graduating by this empiric way the ascensional movement, applied it to the disturbances of circulation.

Cycling on a flat ground is the type of the mechanical automatic movement.

We made, a bicycle (fig. 8) which we call “orthopedical” presenting the following advantages:

- 1° *Suppression of the equilibrium effort ;*
- 2° *Dosing of the resistance ;*
- 3° *Dosing of the amplitude of the movement ;*
- 4° *Possibility to limit the movement to a single leg and to execute it with a resistance differently to each side.*



The Zander collection includes a series of automatic movement apparatus, such as for circumduction of the hand, the arm, the foot and the leg.

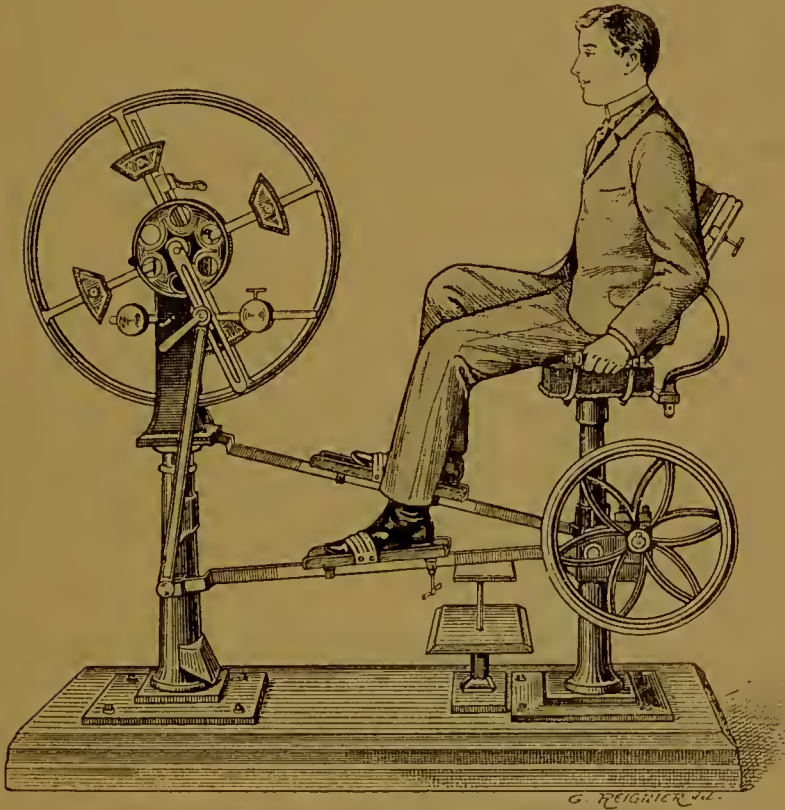


Fig. 7 — Orthopedical bicycle.

### The hypotendous.

*A too low arterial tension is caused through weakness of the heart and consecutive slackening of peripheric circulation: therefore the therapeutic prescription is to stimulate the heart after having first diminished the*



# LÉGENDE

- A. — Salle d'attente.
- A. C. — Air chaud.
- B. — Bains.
- B. P. — Bains de pieds.
- B. S. — Bains de siège.
- B. V. — Bains de vapeur.
- C. L. — Cabines de luxe.
- D. — Douches.
- D. L. — Douche locale.
- L. — Lingerie.
- M. — Massage.
- M. D. — Massage-Douche.
- P. — Piscine.
- P. F. — Piscine froide.
- S. — Salon.
- V. — Vestiaires.
- W.-C. — Water-Closets. Toilettes.



*passive resistance which exists at the periphery especially in the abdominal veins.*

Venous circulation is improved by passive movements of the members, the trunk and the pelvis; through the different proceedings of massage and vibration and principally through the respiration movements.

*The physiological tonic of the heart is active exercise;*



Fig. 9. — Movement by auto-inhibition; manual method.

but to understand the medication of the cardiac and vascular diseases (and this medication can only be functional) through methodical exercise and movement, one must separate from the word “exercise” the idea of muscular effort and distinguish in every active methodical movement, a local effect, which is peripheral and propor-

tionate to the parts of the muscles brought into action, and a central effect which is in proportion with the consumption of the specific energy and the cerebral activity.

Patients with low arterial tension should adopt active exercise under the form which we call "exercise by auto-

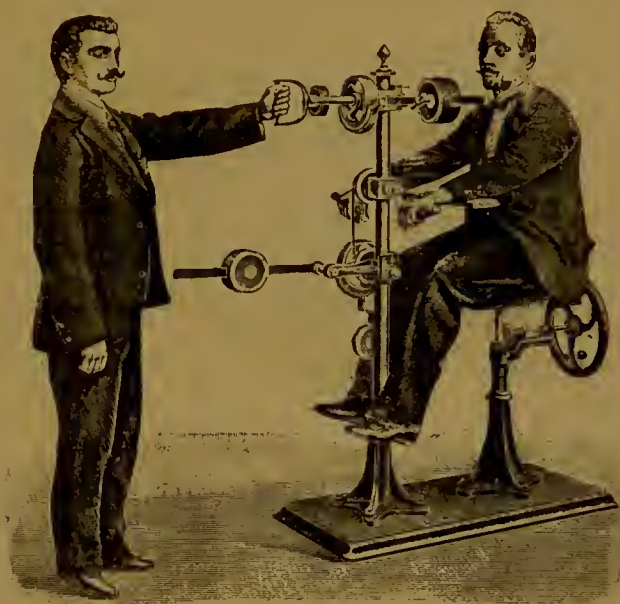


Fig. 10. — Movement by auto-inhibition; mechanical method.

inhibition" in which the nerves principally act, whilst the muscular work is slight.

This is a really cerebral gymnastics, which forms the principal element of the method of Schott Brothers from Nauheim, with whom we disagree for being too exclusive and not sufficiently distinguishing the indications of automatic movements.

Among the patients treated in Vichy we meet in general a low arterial tension in the cases of neuro-arthritis, Beard's disease, fat heart and asthenic gout.



For those patients, the treatment by methodical movements is not only symptomatic but corresponds to the pathogenic indications and is certainly the most indispensable complement of mineral cure.

### **Nervous heart affections.**

When Professor Potain wrote “that there is not *necessarily* a connection between the palpitations, the affliction or the precordial pain and the lesion of the heart”, he wished to make understood that nervous heart affections can be divided in two parts: one, being symptomatic affections, in which case the heart is safe or only secondarily affected in its function; the other, being idiopathic affections in which the functional disorder depends upon a primitive lesion of the circulation apparatus.

In some symptomatic affections of the heart, such as false angina, tachycardy of the dyspeptic (stomach-intestine-liver), weakned heart (neurastheny, obesity), the medication through methodical exercise and movement can easily be adapted to the special pathogeny of the affection; and although, it is always important to find out if not the general affection, or the disease of the digestive organs, has produced an anatomical lesion of the circulatory apparatus.

The distinction we have made, at a therapeutical point of view, of the disturbances of circulation, in two parts, the one of the patients with low arterial tension, the worn out, the other of those with high tension, the excited, can perfectly be applied to the nervous affections of the heart.

The sphygmometer is here more useful to us than the sphygmograph, it being more important to know the arterial pressure, function of the muscle of the heart, than to establish the tachy-arythmy, function of the innervation.

\*  
\* \*

In cases of low arterial tension the medication will take into consideration the astheny of the heart and will begin with passive movements, manuel and mechanical frictions and vibrations of the members, respiratory gymnastics, in order to facilitate the peripheral circulation; later on active movements can be used, limited to small muscular parts, in the form of auto-inhibition exercises, as to stimulate directly the heart (Cerebral gymnastics).

\*  
\* \*

For patients with too high arterial tension we will indicate the automatic movements and the active exercises of large muscular parts, but not consuming more than a small part of the specific energy of those muscles.

Practise has shown us and physiology is still in this instance depending on clinical observation, that the vibration of the precordial region produces a sedative effect on the cardio-vascular centres: the pulse slackens, the arythmy disappears and the patient shows a relief of the affliction and of the precordial pain.

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Not seldom does the nervous affection of the heart depend both, on a lesion of the circulatory organs and from a trouble of the digestive functions.

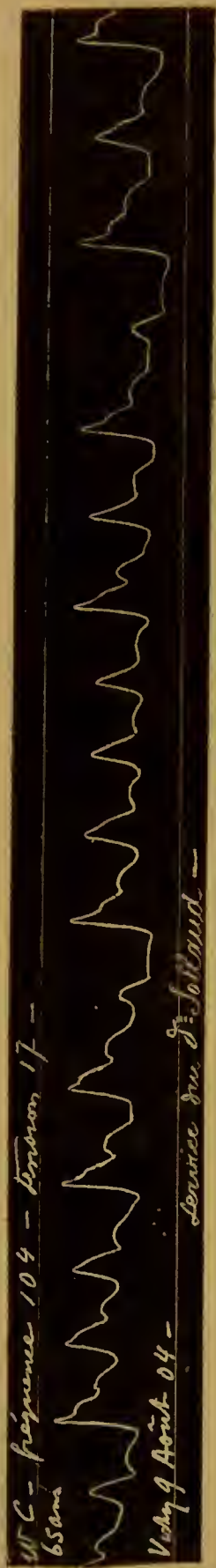


Fig. 11. Observation III. Regularisation of the pulse by methodical movements.



As an example we could mention what Professor Huchard so exactly calls "the double hypertension", characterised by the alternating diastolic resounding which is observed when the patient affected with arterio-sclerosis gets dyspeptic.

In our mecanotherapy and massage department in the thermal Establishment of Vichy we have observed many cases of this kind.

The functional treatment is for those patients the necessary supplement of the alkaline thermal cure and of the alimentary diet; it gives them great and quick relief.

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\* \*

The counter indications of the treatment by methodical movements and massage of the disturbances of circulation are: all the acute affections of the circulatory apparatus, aneurism, trombosis and certain well characterised forms of cardiosclerosis in which there exists a degeneration of the muscle of the heart.

By instance, the arhythmy of the pulse, characterised by a rythm alternans, doubled or tridoubled, is generally caused by cardio-sclerosis of arterial origin (fig. 44).

The passive and automatic movements, the vibration and the massage can improve those patients but will never entirely re-establish the normal function of the heart, altered by the degeneration of the cardiac muscle.

### **The vibration of the heart.**

Of all vibratory methods, the oldest and the most known is the vibration of the heart employed in the troubles of the circulation.

The most used apparatus is the large vibrator of Dr Zander composed of a horizontal bench on which the patient



Fig. 12. — Vibration on the Epigastrium.

can put his legs and of a vertical shaft on which balls of different form are adapted.

At the beginning the large vibrating ball is applied on

the epigastrium (fig. 12); after a few days, when the patient gets used to the vibration, we can adapt the ball directly

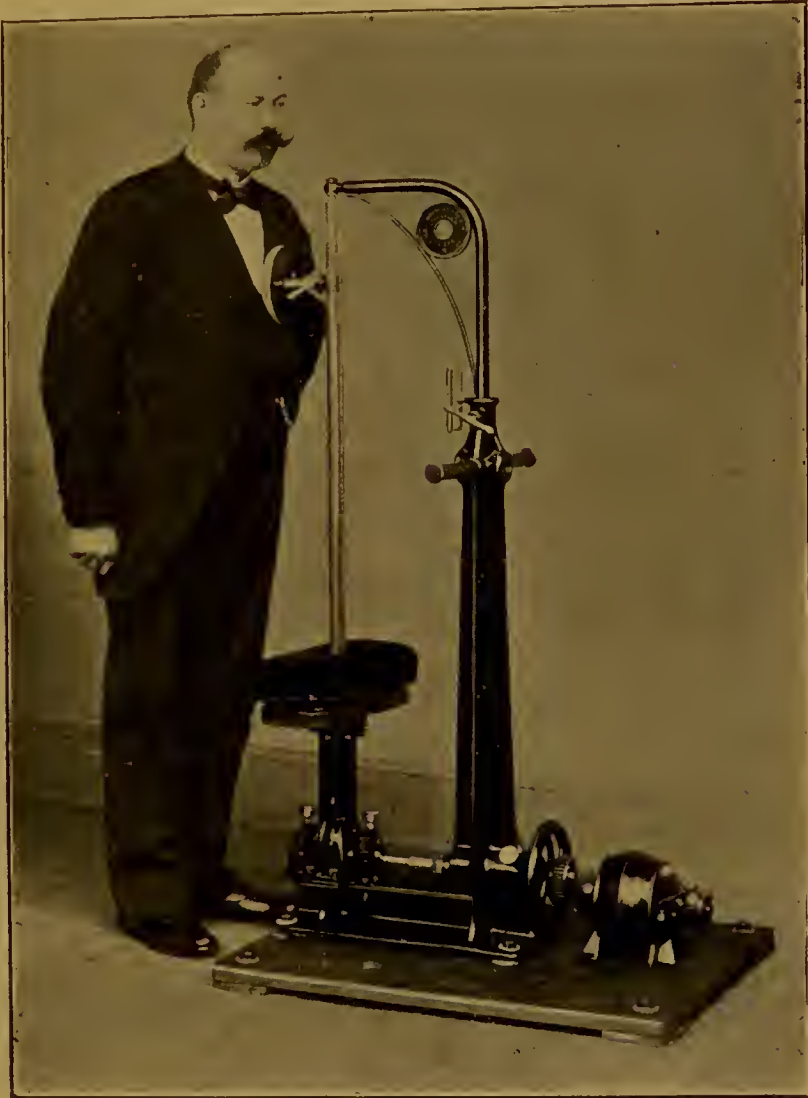


Fig. 13. — Precordial Vibration.

to the precordial region, (fig. 13) or if some special care is required, backwards at the height of the left shoulder (fig. 14).

\*  
\* \*

*The vibration of the heart has been called the digitalis of the gymnast; indeed, the action of the vibration is to be compared to that of digitalis; for instance, while the vibration of the heart produces no effect on a healthy person, we observe that in a case of weakened heart it causes a slower pulse, an increase of the arterial pressure and an improvement of the diuresis.*

This mechanical digitalis prescribed in all cases of hypotension is, in the hands of the man who knows its management, a no less defence than its pharmaceutic homonym.

Both work favorably on the latent forces which the heart still disposes of and re-establish the cardio-vascular innervation; *but the vibration has not the cumulating character of the digitalis and its application can also be continued without stopping.*

In cases of nevroses of the heart, causing feeling of anxiety and precordial pain, we use the percutory vibration, called trepidation of the heart.

We place the patient in such a manner that the side of the ball percutes the precordial region, principally at the height of the point of the heart and always to the left of the parasternal line. The precordial trepidation affords immediate relief.

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The following are a few prescriptions of mecanotherapy which we select among the observations taken on the

patients we treated in our mecanotherapeutical department at Vichy.

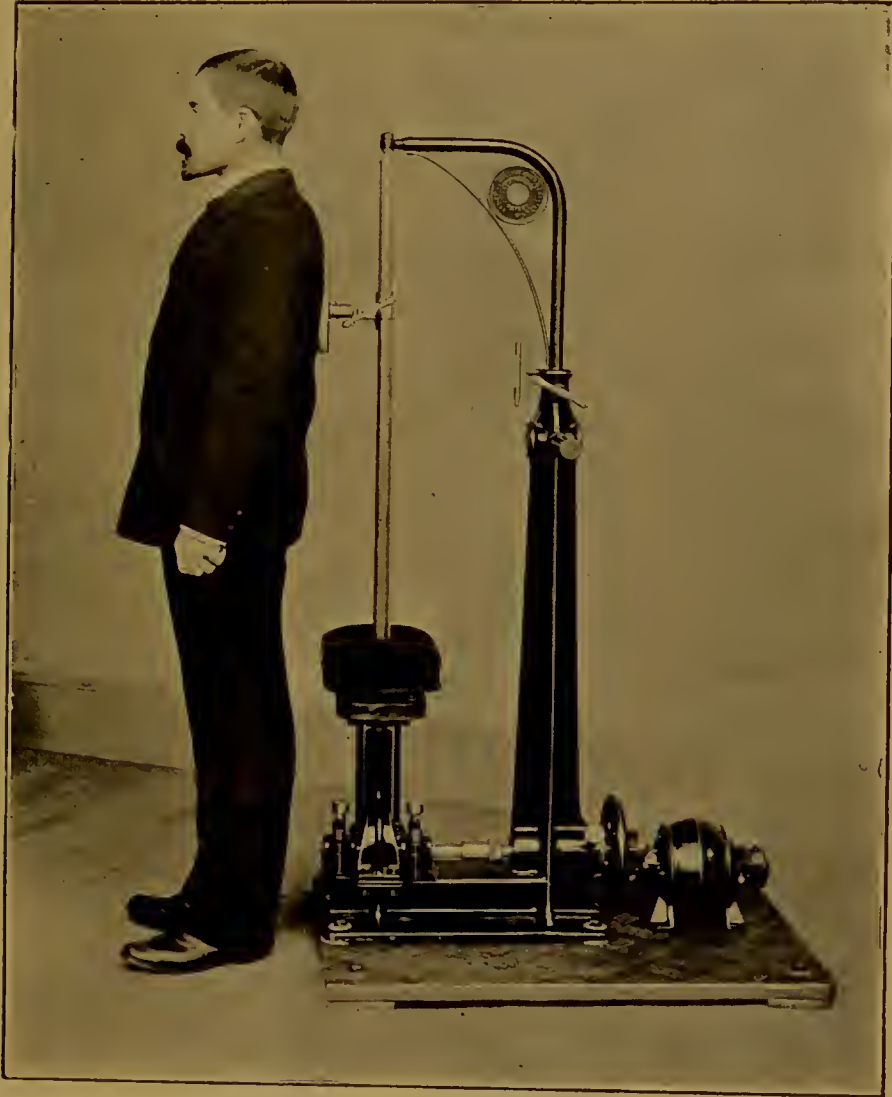


Fig. 14. — Indirect Vibration of the heart.

*Observation 1.*

M. A. 59 years old. was sent to us by Dr Nicolas, consulting physician at Vichy with the following note:

Obesity, fat heart, passive congestion of the lungs. light œdema on the ankles, still present in the morning, especially on the left; flatulent dyspepsy; distension of the stomach, constipation; inclined to giddiness; weakness and pain in the lower members.

**Scheme of movements.**

F<sup>1</sup> vibration of the legs, 2 min. (fig. 24.)

E<sup>5</sup> passive movement; circumduction of the legs, 2 min.  
(fig. 24.)

D<sup>2</sup> passive movement; circumduction of the pelvis, 2 min.

F<sup>1</sup> vibration on the epigastrium, 2 min. (fig. 12.)

A<sup>5</sup> respiratory gymnastics; passive inspiration, active  
lengthened expiration, 15 ×.

*5 minutes rest.*

J<sup>1</sup> friction of the arms, 3 min.

A<sup>7a</sup> automatic movement; circumduction of the arm,  
2 min. (fig. 6.)

E<sup>7</sup> passive movement; lateral balancing of the pelvis,  
2 min.

F<sup>1</sup> vibration of the legs, 2 min. (fig. 5.)

B<sup>12</sup> automatic movement; circumduction of the foot,  
2 min. (fig. 23.)

*5 minutes rest.*

J<sup>6</sup> abdominal friction. 2 min.

F<sup>1</sup> abdominal vibration, 2 min.

E<sup>8</sup> antiptotic bench; passive movement; lengthened pas-  
sive inspiration, 20 ×.



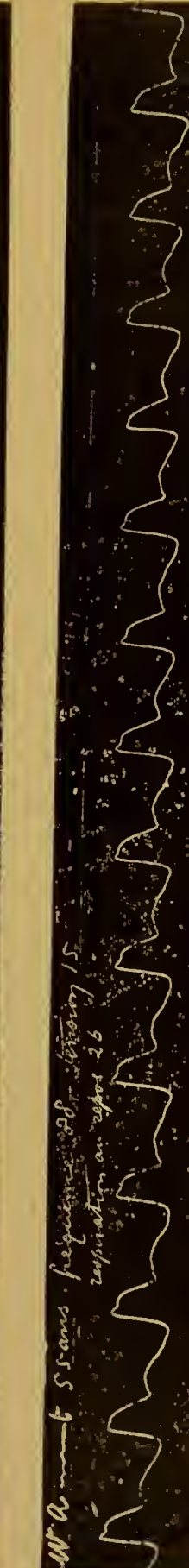
W. A. mnt. 55 ans - fréquence 112 - tension 12 -  
respiration au repos 30 -



W. A. mnt. 55 ans - fréquence 100 - tension 13 -



W. A. mnt. 55 ans - fréquence 98 - tension 15 -  
respiration au repos 25 -



W. A. mnt. 55 ans; fréquence 80 - tension 17 -  
respiration au repos 20 -



Fig. 15. Observation I. Sphygmographic lines demonstrating the gradual improvement of the function of the heart: by degrees the pulse gets slower, the arterial tension higher and the breathing easier.

J<sup>5</sup> friction of the back, 3 min.

E<sup>6</sup> passive respiration, 15 X. (fig. 4.)

The sphymographic lines (fig. 15) are the demonstration of the progressive improvement of the function of the heart.

### *Observation II*

Mrs X., 60 years old, was sent to the mecanotherapy by Dr Durand-Fardel consulting physician at Vichy, with the following indications. Obesity, fatheart, passive congestion of the liver; low arterial tension; pulse small, frequent, regular.

### **Scheme of movements.**

E<sup>2</sup> passive movement of the hands, 2 min.

F<sup>1</sup> trepidation of the legs, 2 min. (fig. 5.)

E<sup>7</sup> passive movement of the rump, 3 min.

A<sup>11</sup> active exercise of the hands; flexion with auto-inhibition, 8 movements into, 2 min. (fig. 10.)

### *5 minutes rest.*

A<sup>7a</sup> automatic movement of the arms, 2 min. (fig. 6.)

E<sup>5</sup> passive movement; circumduction of the legs, 2 min.

A<sup>5</sup> respiratory gymnastics; passive inspiration, active lengthened expiration, 10 X.

B<sup>11</sup> passive movement of the feet, 2 min.

### *5 minutes rest.*

A<sup>8a</sup> active movement of the arm; pronation and supination with auto-inhibition. 8 movements into 2 min.



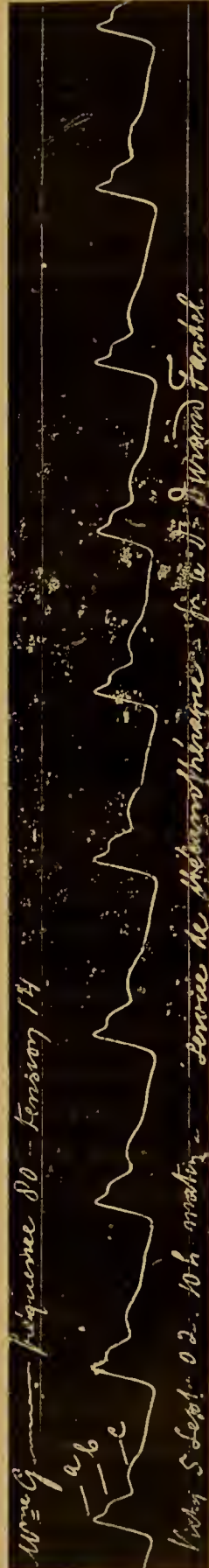
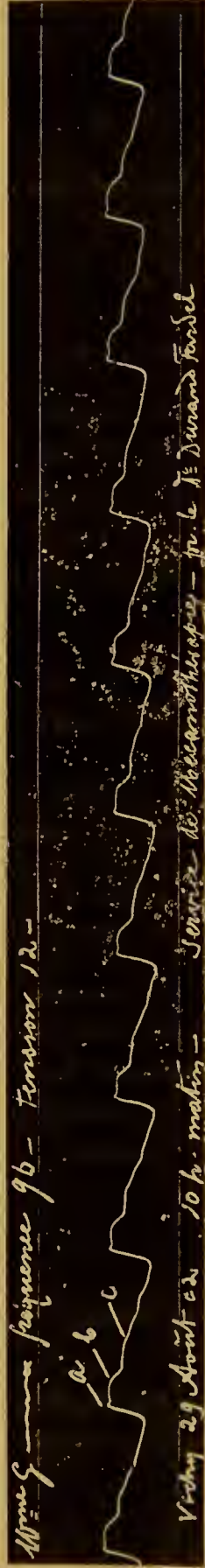
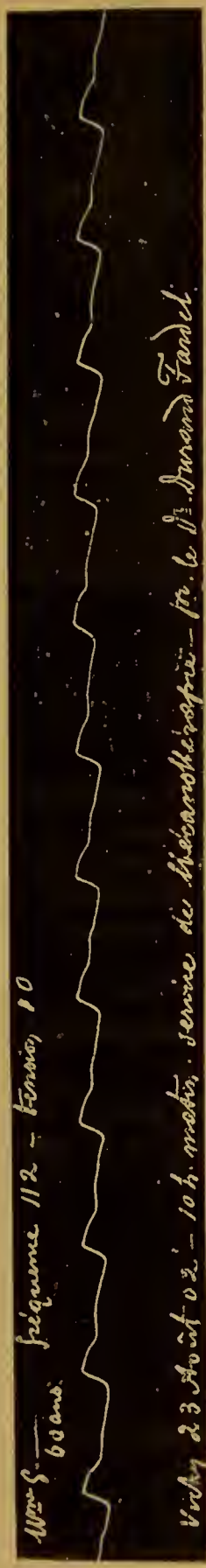


Fig. 16. Observation II. Shygmographic lines demonstrating the gradual improvement of the function of the heart.

B<sup>12</sup> passive movement; circumduction of the feet, 2 min.

F<sup>1</sup> vibration of the legs, 2 min.

E<sup>6</sup> passive respiration. 10 X.

*5 minutes rest.*

During all this movements the patient is sitting down.

After a few days, when breathing and circulation are improved, more active exercises can be given.

The sphygmographic lines (fig. 16) taken during the treatment are the demonstration of the improvement of the circulatory functions.

### *Observation III*

Mr C., 65 years old, was advised by Dr Sollaud, consulting physician at Vichy, to a mecanotherapeutical treatment.

The patient is afflicted by chronic dyspepsy and arteriosclerosis; since 5 years he only takes milk and vegetables. Nevertheless we noted a marked crethysm on heart and vessels.

By the mecanotherapeutical treatment we intend :

- 1° To diminish the nervosism of the circulatory apparatus;
- 2° To stimulate the function of the digestion :
- 3° To activate the general condition of the patient by the effect of a mild exercise proportioned to his strength.

### **Scheme of movements.**

F<sup>1</sup> Vibration of the legs (fig. 5), 2 min.

F<sup>1</sup> Vibration on the épigastrium (fig. 12), 2 min.

J<sup>1</sup> Friction of the arms, 2 min.

A<sup>7a</sup> Circumduction of the arm (fig. 6), 2 min.

*5 min. rest.*

E<sup>7</sup> Passive balancing of the pelvis, 2 min.

C<sup>8</sup> Active rotation of the pelvis, 10 × in both directions.

B<sup>12</sup> Automatic circumduction of the foot; (fig. 23), 2 min.

K<sup>1</sup> Vibration of the legs, 2 min.

*5 min. rest.*

B<sup>7</sup> Orthopedic bicycle (fig. 7), 3 min.

E<sup>5</sup> Automatic circumduction of the leg. (fig. 24), 2 min.

D<sup>1</sup> Passive rotation of the pelvis, 2 min.

E<sup>6</sup> Passive respiration. 15 ×

The sphygmographic lines (fig. 17) give evidence of the improvement of the circulatory function.

## II

### **Abdominal troubles.**

The favorable influence of the abdominal movements, both active and passive on the normal digestion is well known and has moreover been proved by numerous experiments.

*No less useful are the active and passive abdominal movements in the functional digestive troubles, provided they be carried out methodically and appropriated to the variable and individual conditions of the patient.*

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The mecanotherapeutical apparatus answer to all the purposes of abdominal gymnastics, active and passive.

The active abdominal movements are :

1° The frontal flexion of the rump by the straight abdominal muscles.

2° The rotation of the pelvis by the oblique and transversal muscles.

3° The continued active inspiration by the thoracic diaphragm.

This active abdominal gymnastics increases the intra-abdominal tension, awakens peristaltic motion and strengthens the muscular cover of the stomach.

Its most essential indications are : the releasing of the abdominal cover;—chronic constipation;—atonic dilatation of the stomach.

The passive abdominal movements are :

1° The lateral swinging of the pelvis;—apparatus E<sup>7</sup>.

2° The rising of the pelvis;—apparatus E<sup>8</sup>.

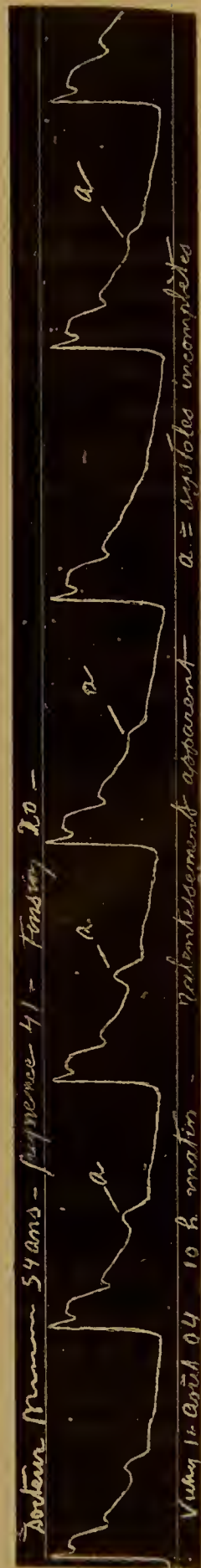
3° The frontal flexion of the rump;—apparatus D<sup>1</sup>.

4° The circumduction of the pelvis;—apparatus D<sup>2</sup>.

The two first movements have a decongestional effect ; they diminish the intra-abdominal pression ; increase the return circulation and are thus indicated in all the cases following the congestion of the abdominal organs, such as: passive congestion of the liver;—abdominal plethora combined with obesity or heart disease;—hemorrhoids; the passive congestion of the genital organs.



Fig. 17. Chronic myocarditis. Alternating pulse.



Influence on the same pulse of dyspeptic troubles.



The movements produced by the apparatus D' and D', passive frontal flexion of the rump and passive circumduction of the pelvis, have the same effect as the corresponding active movements. *e. e.* they increase the intra-abdominal pression, awaken the peristaltic and tonify the muscles of the cover.

The principal indications of those passive movements are: visceral atony;—chronical constipation;—amenorrhea.

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The manual and vibratory massage forms an integral part of the abdominal gymnastics and as all abdominal



Fig. 18. — Massage bench of Dr Vermeulen.

massage is to be followed by active and passive abdominal movements, we have constructed a massage bench, such as shown by (fig. 18), permitting the easy combination of massage and gymnastics.

This apparatus has the advantage that the middle piece



on which rests the pelvis of the patient may be placed and fixed at a given height; moreover this piece communicates to a motive power by which an ascending movement, of variable amplitude can be given to it.

Under these circumstances a rise of the pelvis can be produced, determining an elongation of the thorax and consequently a diaphragmatic breathing with continued inspiration.

*This passive respiratory gymnastics activates the return circulation and suppresses the intra-abdominal venous stasis; the statical effect produced by the rising of the pelvis, causes the organs to return to their natural place and re-establishes, in cases of "ptosis", the abdominal equilibrium.*

Above this massage bench we have placed a Liedbech's vibrator.

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All abdominal massage has to be preceded by a minute exploration of the abdominal organs, which enlighten us on all the abdominal statical conditions; for it, our massage bench, with intermediate movable piece, affords particularly favorable conditions.

The chief indications for abdominal massage, considered as complement of the thermal Vichy cure are :

- 1° Atonic dilatation of the stomach.
- 2° Chronic constipation.
- 3° Viscéral ptosis.
- 4° Abdominal plethora.

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In the case of dilatation of the stomach the massage has to take place four hours after the morning meal; it comprises:

1° A complete massage of the intestines such as for chronic constipation;

2° A sedative vibration of the pilorus, executed by means of the mechanical vibrator;

3° A manual vibratory percussion around the long side of the stomach.



Fig. 19. — Effleurage of the large intestine.

The chronic constipation has sometimes a spasmodic character but is generally of an atonic origin.

The spasmodic constipation requires very light manipulations; generally speaking, these patients have the stomach hard, sensitif, flat; the vibration applied on the level of the umbilicus has remarkable effects on them, especially so, if combined with passive elevating movements of the pelvis, producing passive respiratory movements.

In our mecanotheapeutical department at Vichy we have treated several cases of spasmodic constipation, having resisted all previous treatments and which our sedative vibratory massage has rapidly cured.

The atonic constipation requires an energetic massage to activate mechanically the movement of the intestinal contents, to awaken the peristaltic and to tonify the muscular cover of the intestine:

We apply with small modifications the Mezger-von Mosengeil's method of which the technique (fig. 19 et fig. 20) are described in every special treatise for massage.



Fig. 20. — Petrisage of the large intestine.

The movement of our massage bench must be regulated in such way, that it produces during all the time of the massage a slight passive breathing, by which the resistance of the abdominal muscles is avoided and which favorising greetly the return venous circulation, decongestions the intestinal coat.

This massage should in preference take place in the morning whilst the patient is still fasting.

In the beginning it is useful to apply during the night a Priesnitz bandage.

Some times it is necessary to make a second massage in the evening; under these conditions it is seldom that full success is not achieved after a few weeks.

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The mechanical treatment of enteroptosis or Glenard's disease by abdominal massage and passive abdominal movements comprises:

1° The passive rising of the pelvis; Glenard named our apparatus, an antiptosomal bench, so as to clearly express the effect produced by this movement, on the abdominal equilibrium.

2° Soft and methodical manipulations made whilst the patient undergoes this movement and having for effect the repulsion of the intestins to their primitif and natural situation.

The effect of this passive abdominal gymnastics is;

1° An immediate relief of the mostly generalised intestinal neuralgia (Auvard).

2° An easier evacuation of the intestinal contents;

3° A progressif increase of the intra-abdominal pressure.

In Glenard's disease, the active abdominal gymnastic is forbidden as long as the patient is complaining of pain.

In the pathogeny of enteroptosis, the atrophy of the muscular abdominal covering has generally but a secondary importance; it is chiefly the result of the decrease of the intra-abdominal pressure.

The mecanotherapy, which Professor Huchard so precisely calls the combination of rest and movement, has a very great importance in the general treatment of enteroptosis.

“In this affection, says Professor Tuffier, all the elements of the economy seem struck at the same time by an insufficient nourishment, vitality and resistance. They are in a state of physiological inferiority”.

As complement to the pathogenic treatment of this affection, a mild and precise gymnastics is surely the best means for the patient to recover his former strenght.

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In abdominal plethora, in which in opposition to enteroptosis, the abdominal tension is exaggerated, the massage and the abdominal movements, activate the return circulation, decongest the abdominal organs, thereby diminishing the flatulence and consequently re establishing the normal tension.

The massing manipulations should chiefly consist of rocking and balancing movements of the whole the abdominal parts.

The best way to improve the abdominal venous circulation is the methodical breathing; our massage bench on which the patient is subjected to passive inhailments, of which we can regulate the number and the amplification, is certainly the ideal process for abdominal gymnastics such as required by plethoric patients.

### III

#### The functional treatment of Gout.

Gout appears either in the form of acute or chronic accidents of the articulations or under the appearance of visceral affections like: asthma, biliary lithiasis, gravel, hemorrhoids, tenacious headache, of which MM. Senac and Willemin, both most eminent and regretted practitioners at Vichy, and after them M. Bouchard had demonstrated the close affinity.

At Vichy every form of gout is attended to, but the springs are especially preferred for gout combined with obesity, lithiasis or diabetes.

*“It is well known that the most important indications in a case of gout are to maintain the integrity of the nutrition and to stimulate it when flagging, to assist the system to free itself of an excess of uric acid and to prevent or diminish its formation.”* Dr Cormach (1).

The Vichy water does not only eliminate the uric acid salts but it appears to prevent their formation, either by a direct chemical action on the cellular nutrition, or by the stimulation it exerts on the digestion.

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The functional treatment of gout is no less important than the mineral and we should say that both could not be separated.

(1) M. Cormack. The waters and baths of Vichy, 1904. Paris, Maloine.



Every practitioner knows the special reaction which gouty people have with baths and other hydrotherapeutical proceedings; this only proves the general vulnerability of those patients to which we must pay the greatest attention.

In acute articular gout the treatment by local radiant

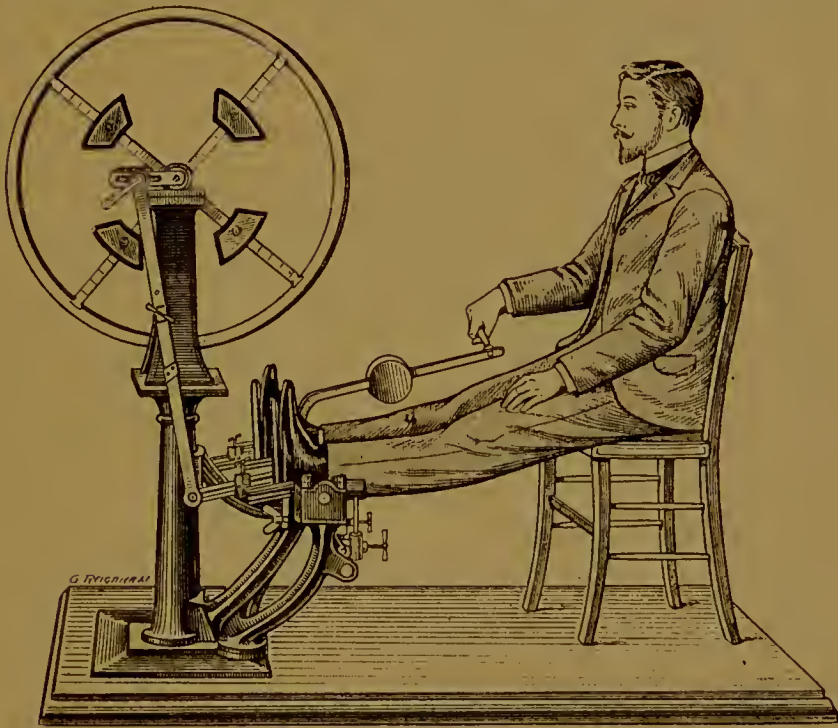


Fig. 21. — Flexion and extension of the feet (automatic).

heat baths brings the patient an immediate relief of the pain; these local baths must be taken twice a day each time 10 till 15 minutes and the temperature of the bath must be brought up till 150° celsius.

The results of this treatment which we apply since three years in our physical Institut in Paris (1) and which we introduced in Vichy are the most remarkable.

(1) Institut de Mécanothérapie de Paris ; 32, rue N.-D. des Victoires. Direction : Docteurs Courtault et Vermeulen.

In chronic articular gout the radiant heat baths produce a dissolution of the uric acid deposits, as one can control by radiosopic examination.

The stiffness of the articulations and the muscular weakness need methodical active and passive movements but we must always remember that the gouty articulation is particularly vulnerable.



*Of much greater importance is the functional treatment of the general condition of the patient; as a rule, we give to our gouty patients gentle exercises with the object, not to stimulate the nutrition (which like Lecorche's ice, believe already increased) but to obtain a sedative action on the nervous system, while at the root of almost every gout one can find Dyce Duckworth's trophoneurosis.*

As to the complications of gout with obesity, diabetes, weakened heart, arteriosclerosis, we refer to the special development we gave of them; we don't need to repeat that the functional treatment applies not to the gout but to the gouty patient, for whom in every case the results of the treatment by methodical movements are remarkable.

#### IV

### Chronic Rheumatism.

When this is favorably influenced in its articular and intestinal appearance by the general effects of the thermal Vichy cure, it is necessary, to fulfill the treatment, to have

recourse to the susceptible means in order to re-establish the functional soundness of the muscles and articulations and to strengthen the general organical structure, more or less seriously affected by the illness.

The methodical mecano-therapeutic movements and the

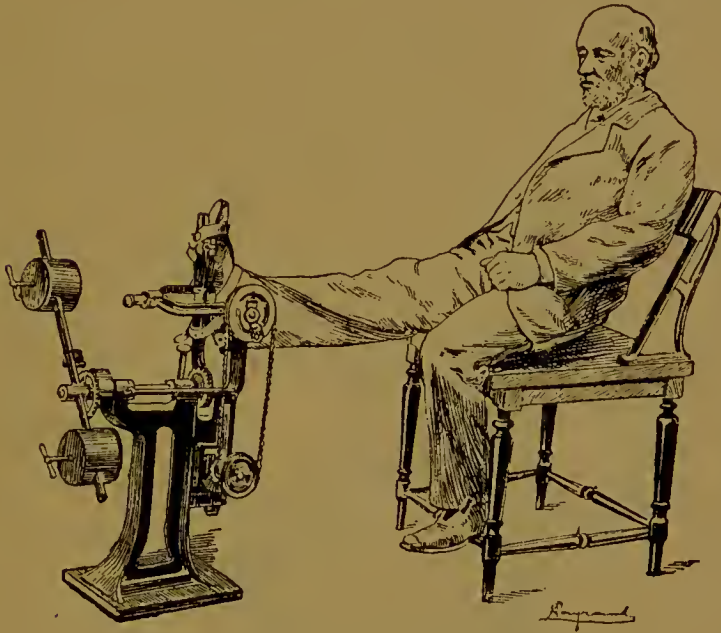


Fig. 22. — Active pronation and supination of the foot.

massage, comprised with a hydrotherapy skilfully managed, are in this instance of great value.

One has recourse to the passive movements in cases of articular stiffness or tendinous rigidity, as well as to prevent the muscular retractions; but they are to be employed with the greatest care and moderately, in order to prevent the reflex contraction of the antagonistic muscles and the inflammatory recrudescence.

The mecano-therapeutic apparatus producing a passive, continuous and regular movement of a determinate ampli-

tude, capable of being increased inch by inch, affords in this instance every guarantee.

The active movements, when once possible, permit the muscular reeducation and the striving against the muscular atrophy which, resulting from articular rigidity, is often very great.

These movements are begun with minima of resistance,

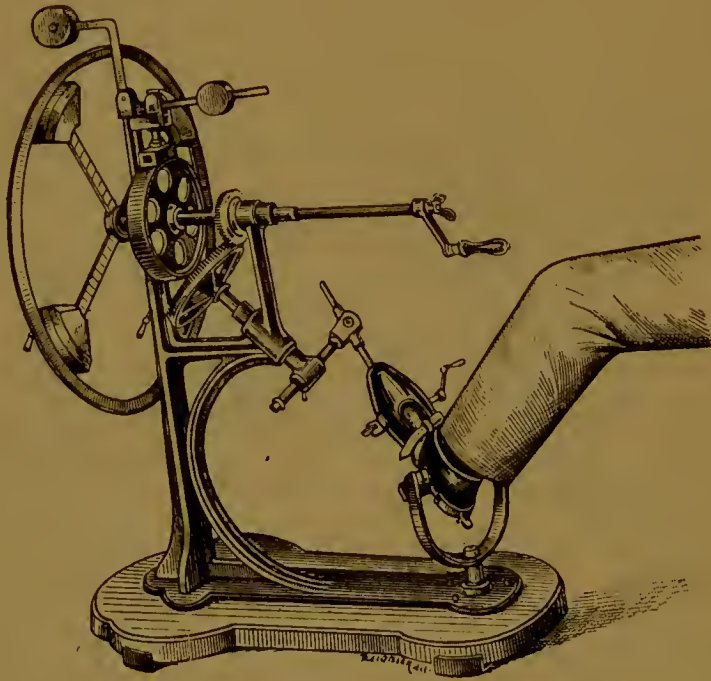


Fig. 23. — Passive circumduction of the foot.

which is only to be increased when the patient performs his exercise with great ease.

The apparatus permit to localize and to apportion the muscular work and to mathematically check the progress of the treatment.

Massage is the indispensable completion of this treatment.

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Besides this local treatment the chronic rheumatism still requires a general reconstituting treatment, the principles of which are the breathing gymnastics and the passive and active movements prescribed to activate the circulation.

The mecanotherapic formula appropriated to the individual and momentary power of the patient is always composed in such a way that at the end of the sitting he feels not the least fatigue.

Combined to the general effects of thermal waters, this functional medication strongly contributes to insure a prompt and lasting recovery to the patient.

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In arthritis deformans functional treatment gives no result so soon as the bony substance is itself attacked or that worn articular surfaces exist.

The radiosopic examination is often necessary to determine the diagnosis between chronic rheumatism and arthritis deformans.

The successful operations performed by Professor Lejars warrant in certain cases surgical intervention.

## V

### **The functional treatment of the diabetes.**

Besides the thermal cure by means of strong bicarbonate waters of which Vichy in France and Carlsbad in



Austria represent the type; besides certain chemical agents such as antipyrine (Albert Robin), arsenic (Trousseau, Leube, Lecorché), the opiates (Villemin), and of a nourishing diet appropriated to the evolution of the illness and to the individuality of the patient, — the physical elements assume in the hygiene and treatment of the diabetic a more and more valued place and it is evident that among these the methodical movement medication, under the scientific form, viz, the mecanothe-  
rapy, is called to be included in the treatment.

This functional medication of the diabetes is not new; already in 1869, Doctor Zander of Stockholm foresaw the use of mecanothe-  
rapy in the case of diabetes and it is really interesting to notice that at the time when diabetes was generally considered as an illness caused by the slackening of the nutrition, Zander recommended to treat the diabetic in a similar way as the heart patients, i. e. by passive movements and active moderate exercises.

This is how Professor A. Robin (1) considers the exercise question for diabetics: “no diabetic can do without exercise as this is the necessary adjuvant of the diet; but the exercise, whatever it be, must be gradual and moderate.

One is not to aim, as certain wrongly advise, at the maximum exercise in the minimum time.

*One has to demand of the muscular organs but their tonic and regulating action on the circulation and especially not to exaggerate until the activate the dissimilation.*

(1) ALBERT ROBIN. Traitement du diabète. *Traité de thérapeutique appliquée*. Paris, J. Rueff.



As Kulz so well shows, too violent exercises are dangerous to the diabetic, moreso if he be of slight constitution.

The moderate and progressive exercise derives and transforms into movement a part of this increased nervous excitement of the diabetic: in this way it is useful and should be heartily recommended.

But the violent exercises increase the denutrition and creates a new danger that Proust well guessed when he indicated as due to muscular fatigue the accidents we have since learned of under the name of diabetic coma.

It is evident therefore that the exercise is to be proportionate to the patients muscular power; its part is purely regulative and when once the oxidizing activity diminishes in the strained muscles, the exercise loses its necessity.

In other words, when the diabetic begins making sugar with the products of his azotised disassimilation, it is necessary to act upon him with great precaution and to remain within the slightest fatigue”.

The old theory which placed diabetes on the same line as obesity, among the illnesses caused by excess of saving, with the difference that the obese would make a saving of fat, the diabetic that of sugar, has passed and with it the practise of imputing to the diabetic a number of muscular exercises sufficient to exhaust the sugar of which his organism is impregnated.

The diabetic is a patient in whom there already exists an excess of all the chemical acts of general nutrition and a special overactivity of certain organs, principally of the liver and the nervous system; he is in such a

state of special vulnerability that any physical or moral excess and all traumatism attains him more effectively.

The study of diabetic nutrition teaches us that the total

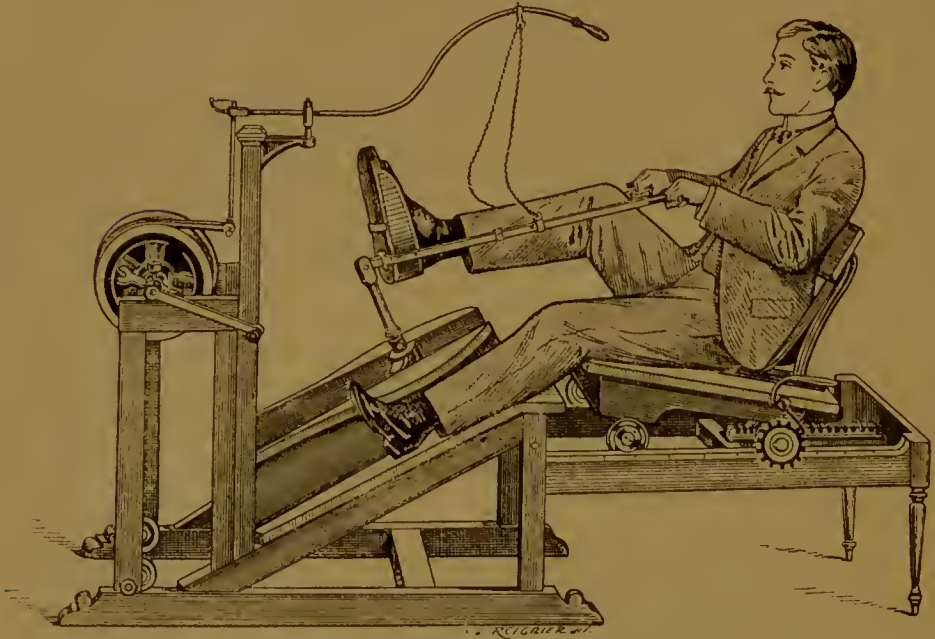


Fig. 24. — Passive circumduction of the leg.

disassimilation is increased, the azote utilisation-coefficient above the normal, the oxyhemoglobine increased in the blood; that the urea achieves generally a high proportion and that the vanished carbonic acid and the consumed oxygen slightly rise. (Quinquaud, Ab. Robin and Binet.)

One has to agree therefore that active exercises, in fairly massive portion to increase the oxydizing processes, are not beneficial to the diabetic.

*The aim of the exercise with these patients must be nothing other than to activate the circulation and espe-*

*cially to diminish the increased nervous excitement; it is by the sedative effect of the methodical movements that we seek to decrease the overactivity of the general nutrition and of the hepatic function and by this way the abnormal production of sugar.*

The mecanotherapy is certainly the functional medication which answers best to these indications.

The apparatus are so constructed that the movement is in reality modelled by the apparatus used to make it; the form of the movement is subordinated to the apparatus, the disposition of this being so that once properly placed the patient can only move the group of muscles designed.

The mecanotherapeutic formula of functional treatment of diabetes should answer the various individual indications shown by the patient.

One should above all take into consideration the circulation troubles which often depend more on the general arthritism or gout than on the glucosuria; these affections such as: arteriosclerosis, chronic myocardites, fat heart and fatty degeneration of the heart muscle, the nervous affections of the heart, should be treated independently of the ground on which they are developed (1).

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The functional hypertrophy of the liver, the dyspepsy, the constipation require abdominal decongestioning passive movements, vibration and especially abdominal massage. The neuralgias, among which we will give as

(1) Vermeulen. Les mouvements corporels méthodiques dans les troubles de la circulation. *Progrès médical*, 25 février 1905.

example sciatica, the peripheral nevrites which manifest themselves by momentary and incomplete paralysies



Fig. 25. — Vibration of the face in neuralgia.

accompanied by sensitive troubles, such as anesthesia, neuralgia, shooting pains, are treated by vibration, massage and a few methodical movements.

One must not forget that in the diabetic an increased nervous excitement always exists and that the notable point of the treatment must be its sedative character.

Bouchardat, Herz, Külz mention the good results they have noticed by a moderate cycling exercise ; Robin adds that under the influence of this exercise he has noticed in the urine the decrease of the ternary elements incompletely oxydised.

It is because this exercise, if abstraction be made of the equilibrium difficulties, is an automatic movement which we have called the union between the passive movement and the active exercise.

The automatic movements are under the dependancy of subcortical centres and produce a sedative effect on the cortical centres; they have the mechanical effect of the passive movements and are at the same time an active exercise but in which the nervous defense is void and the muscular work minimum if the exercise is performed with moderation.

The mecanotherapeutic arsenal comprises the apparatus producing the automatic movements of the legs (orthopedic bicycle), arms, hands, feet (circumduction and balancing movement).

If we make such an intensive use of these movements in the cases of diabetes, it is on account of their moderating influence on the nervous system.

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The massage, under the form of general massage, suits as passive movement feeble and anæmic diabetics; it is nevertheless useful to remember that the skin of these patients is very vulnerable and that a diabetic patient is very sensitive to a general chill.



## APPENDIX

### Dietetic gymnastics.

As a dietetic remedy mecanotherapy gains ground every year, especially among a very great number of persons leading sedentary life or a life requiring one sided exertion, such as officials, teachers, merchants and a great proportion of womankind.

As long as the sportsman is young, he exercises his muscles and keeps them in healthy and vigorous development; increasing age, however, asserts its rights while exercise has become a necessity to him. Stiffened by age, his limbs lose their suppleness; a stooping carriage and perhaps increasing corpulence will also prevent his engaging in sport. To such persons the methodical movements will offer a means of continuing their exercise and enable them to struggle with success against the debility and infirmities inherent to old age.

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As developing-gymnastics the mecanotherapy is of great value, especially to boys and girls who suffer from general weakness, which is often accompanied by a stooping carriage and not seldom by curvature of the spine for which weakness, individualized resistance-movements are the best remedy.

These exercises have gradually to embrace the whole muscular system in order to restore the disturbed equilibrium of the organs, to turn the development into its



natural course and to struggle success-fully against nervous overexcitement due to present school-education with its great demands.

The methodical exercises have so far a most important effect on the nerves, that a strengthening of the whole nervous system is indirectly attained and nervousness remains no longer a heavy burden for life, poisoning one's very existence.

If we succeed in developing the muscles of weak children, these will gradually attain the same vigour as their more fortunate companions who may either be more strongly built or have descended from more vigorous parents.

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